

CLAIMS

We claim:

- 1 1. An apparatus comprising:
2 a low threshold voltage stage, wherein active load components of the low
3 threshold voltage stage have a first threshold voltage value; and
4 a high threshold voltage stage to receive a signal output from the low threshold
5 voltage stage and to generate its output, wherein an active component of the high
6 threshold voltage stage has a second threshold voltage value which is higher in
7 magnitude than the first threshold voltage value.
- 1 2. The apparatus of claim 1, wherein the active load components of the low
2 threshold voltage stage are cascoded.
- 1 3. The apparatus of claim 2, wherein the active component of the high threshold
2 voltage stage is cascaded to the low threshold voltage stage.
- 1 4. The apparatus of claim 3, wherein the low threshold voltage stage is an
2 operational transconductance amplifier.
- 1 5. The apparatus of claim 3, wherein the active load components of the low
2 threshold voltage stage derive lower threshold voltage value by having their gate oxide
3 thickness less than gate oxide thickness of the active component of the high threshold
4 voltage stage.
- 1 6. An amplifier comprising:
2 a low threshold voltage amplifier stage, wherein active load components of the
3 low threshold voltage stage have a lower threshold voltage characteristic to operate at a
4 lower supply rail voltage; and
5 a high threshold voltage amplifier stage to receive a signal output from the low
6 threshold voltage amplifier stage and to generate its output, wherein an active component
7 of the high threshold voltage amplifier stage has higher threshold voltage characteristic
8 than the components of the low threshold voltage amplifier stage.
- 1 7. The amplifier of claim 6, wherein the active load components of the low threshold
2 voltage amplifier stage are cascoded and operate in saturation within the lower supply rail
3 voltage.

1 8. The amplifier of claim 7, wherein the active component of the high threshold
2 voltage amplifier stage is cascaded to the cascoded low threshold voltage amplifier stage

1 9. The amplifier of claim 8, wherein the active component of the high threshold
2 voltage amplifier stage is a single transistor to allow for only a single transistor gate-to-
3 source voltage to set a direct current (DC) bias point at output of the low threshold
4 voltage amplifier stage.

1 10. The amplifier of claim 6, wherein the active load components of the low threshold
2 voltage amplifier stage have their gate oxide thickness less than gate oxide thickness of
3 the active component of the high threshold voltage amplifier stage.

1 11. The amplifier of claim 6, wherein the high threshold voltage amplifier stage
2 operates at a higher supply rail voltage than the low threshold voltage amplifier stage.

1 12. The amplifier of claim 6, wherein the low threshold voltage amplifier stage is an
2 operational transconductance amplifier.

1 13. An integrated circuit comprising:

2 a plurality of audio amplifiers, in which the amplifiers are comprised of:

3 (a) a low threshold voltage amplifier stage, wherein active load
4 components of the low threshold voltage stage have a lower threshold voltage
5 characteristic to operate at a lower supply rail voltage; and

6 (b) a high threshold voltage amplifier stage to receive a signal output
7 from the low threshold voltage amplifier stage and to generate its output, wherein an
8 active component of the high threshold voltage amplifier stage has higher threshold
9 voltage characteristic than the components of the low threshold voltage amplifier stage.

1 14. The integrated circuit of claim 13, wherein the active load components of the low
2 threshold voltage amplifier stage are cascoded and operate in saturation within the lower
3 supply rail voltage.

1 15. The integrated circuit of claim 14, wherein the active component of the high
2 threshold voltage amplifier stage is cascaded to the cascoded low threshold voltage
3 amplifier stage

1 16. The integrated circuit of claim 15, wherein the active component of the high
2 threshold voltage amplifier stage is a single transistor to allow for only a single transistor

3 gate-to-source voltage to set a direct current (DC) bias point at output of the low
4 threshold voltage amplifier stage.

1 17. The integrated circuit of claim 15, wherein the active load components of the low
2 threshold voltage amplifier stage have their gate oxide thickness less than gate oxide
3 thickness of the active load component of the high threshold voltage amplifier stage.

1 18. A method comprising:

2 utilizing a lower supply rail voltage on components of an amplifier having a low
3 threshold voltage level characteristic to operate the components in a cascoded
4 arrangement; and

5 utilizing a higher supply rail voltage on a last stage of the amplifier to obtain a
6 higher signal swing output from the amplifier, the higher supply rail voltage utilized on a
7 last stage component having a higher threshold level characteristic than the cascoded
8 components of the amplifier.

1 19. The method of claim 18, wherein utilizing the higher supply rail voltage is
2 achieved on a last stage component that has a single transistor gate-to-source voltage to
3 set a direct current (DC) bias point at output of low threshold voltage components of the
4 amplifier.

1 20. The method of claim 18 further including amplifying an audio signal through the
2 amplifier